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Basking Ridge, NJ 07920

January 7, 1999

EX PARTE OR LATE FILED

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
445 Twelfth Street, SW, Room TWB-204
Washington, D.C. 20554

RE: Ex Parte Presentation – Proxy Cost Models
CC Docket No. 96-45

Dear Ms. Salas:

On January 7, 1999, AT&T and MCI WorldCom met with Katie King, James Eisner, Jim Zolnierek, Bob Loube, Richard Smith and Abdel Eqab of the Commission staff to present and discuss several empirical analyses that we performed relative to the switching input values that should be used in the Synthesis Model. AT&T and MCI WorldCom were represented by Richard Clarke, Catherine Petzinger and Mike Lieberman of AT&T, and by Mark Bryant and Chris Frentrup of MCI WorldCom.

The attached written materials and diskette display the analyses and results that we conveyed to the staff, and should be made part of the record in this proceeding. Two copies of this Notice are being submitted to the Secretary of the FCC in accordance with Section 1.1206(a)(1) of the Commission's rules.

Sincerely,

Richard N. Clarke/kw
Richard N. Clarke

Attachments

cc: Bob Loube
James Eisner
Jim Zolnierek
Abdel Eqab
Katie King (w/o diskette)
Richard Smith (w/o diskette)
Sheryl Todd (w/o diskette)

Switching Inputs

Switch Prices

RUS Data

It is important that the RUS data be made as consistent as possible with the FCC's Depreciation/CPR data. It was noted at the December 1, 1998 switching workshop that the RUS data probably does not include the costs of central office power or main distributing and protector frames. AT&T and MCI WorldCom propose that the RUS switch prices be increased by the appropriate amounts, as contained in the HAI 5.0a inputs, for power and MDF/Protector. In performing the statistical analyses described below to determine the appropriate Synthesis Model input values for switching, we have adjusted upward the switch costs reported in the RUS data set in the above-described fashion.[1]

Host/Remote Price Anomalies – Regression Functional Form

The primary difference between a host switch and remote switch is in the extent and complexity of the "getting started equipment," associated with each type of switch (*e.g.*, switch central processor functions, SS7 non-scaleable equipment, maintenance and testing, call recording for billing purposes, etc.).[2] Because most of these functions for lines terminating a remote switch are performed at that switch's host, very little of this type of "getting started" equipment is required at the remote. In contrast, the scaleable equipment used to terminate lines and trunks and to perform basic call processing is essentially the same at the host and remote. In fact, the line units used by Lucent 5E® Remote Switching Modules are identical to those used by 5E host or stand-alone switches.[3] Similarly, the line cards used in Nortel DMS® 100 host or stand-alone switches are the same as those used in DMS 100 remotes, or in DMS 10 host or remote switches.[4] These Lucent and Nortel switches likely make up virtually 100% of the depreciation data set used in the regression.[5]

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[1] Per HAI 5.0a default input values, an upwards adjustment of $12 per line was made for MDF/Protector. Power investments based on the switch's line size were added as follows: $5000 for 0-1000 lines, $10,000 for 1000-5000 lines, $20,000 for 5000-25,000 lines, $50,000 for 25,000-50,000 lines, and $250,000 for over 50,000 lines. The resulting data set is attached on diskette.

[2] In the following discussion, the term "host switch" includes both those host switches that have remote switches subtending them, as well as switches that are "stand-alones."

[3] In the Lucent switch, the same Switch Module (SM) that terminates lines or trunks at a host/standalone switch is placed remotely using copper or fiber. All line and trunk terminating equipment components at the host SMs are the same at the remote SMs.

[4] In the Nortel switches, the same Line Concentrating Module (LCM) that terminates lines at the host/standalone is placed at the remote site. The LCMs at the host and remote sites use identical line card components.

[5] Specific manufacturers are not identified in the RUS data set, however a majority of the equipment is likely to be Nortel.

For these reasons, and because there is no reason to expect any consistent differences in customer usage on host versus remote lines, the scalable costs of line termination equipment required at a host or remote should be almost identical. Thus, any statistical model specification for switching costs should require these variable per-line costs to be identical across host and remote switches. To accommodate this, AT&T and MCI WorldCom have reformulated the FCC Proposed functional form as follows to enforce a single per line variable cost, rather than separate host and remote per line variable costs.

$$Cost = \alpha + \beta_1 * Lines + \beta_2 * Host + \beta_3 * Ln(Time) + \beta_4 * Lines * Ln(Time) + \beta_5 * Host * Ln(Time) + \varepsilon$$

Which converts to the following reduced forms for host and remote switches:

$$Host\ Cost = A_1 + B * Lines,$$
$$\text{where: } A_1 = \alpha + \beta_2 + \beta_3 * Ln(Time) + \beta_5 * Host * Ln(Time), \text{ and}$$
$$B = \beta_1 + \beta_4 * Ln(Time)$$

$$Remote\ Cost = A_2 + B * Lines,$$
$$\text{where: } A_2 = \alpha + \beta_3 * Ln(Time), \text{ and}$$
$$B = \beta_1 + \beta_4 * Ln(Time).$$

Estimating the above functional form for 1997 provides the following switching cost coefficients:[6]

Host constant (A_1):	$290,601
Remote constant (A_2):	$146,808
Host/Remote per line variable cost (B):	$83

While the remote constant may a seem a little high, it should be remembered that this constant captures the costs of both small and large remotes – and some large remotes can be very large. For example, there are eleven remotes out of the 720 remotes included in the combined data set that have greater than 10,000 lines. To give an idea of the heterogeneity in remote sizes provided by the dominant vendors, consider the following. Small remotes generally are provided by Nortel and consist of its 192 line RSLM, 640 line RLCM, and 1024 line RSLE. Midsize remotes serving up to approximately 5,000 lines are available from both Nortel and Lucent, and consist of the Nortel RSC-S, and the Lucent RSM and ORM. In the larger size category, Nortel provides dual RSC-S's that can serve 10,000 lines, and the new Lucent EXM-2000 can serve up to approximately 20,000 lines.[7] The depreciation data set includes all but the Lucent EXM-2000 remote, with the largest number of remotes being the ~5,000 line-size from each vendor.[8]

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[6] Summary outputs from this regression are attached.

[7] A copy of the Nortel web pages defining these remote types is attached.

[8] Because of the heterogeneity in the capacities of different remote switching modules and knowledge of vendor pricing practices, AT&T and MCI WorldCom believe that getting started cost for remotes should vary by classes of line size, e.g., 1-1500 lines, 1500-5000 lines, and over 5000 lines. Unfortunately, the

AT&T and MCI Worldcom have not been able to determine precisely which switches from the depreciation and RUS data sets were included in the FCC's regression analysis, but we have been able to approximate closely the FCC's switch selection. Should more detailed information about the FCC's switch selection process be made available, our selected data set could be fine tuned. Please note that AT&T and MCI Worldcom do not necessarily endorse the prices derived from the above-reported regression studies as correct for forward-looking TELRIC studies. The FCC/RUS data set still appears to contain some irregular observations. For example, the switch indicated as serving nine customers is likely a data error, or the switch may be serving multiple functionalities (*i.e.*, wireless, frame relay or combination local/tandem.) that may elevate implied switch costs. AT&T and MCI believe that other available data suggest that forward looking switch prices are lower than those suggested by these historical depreciation data and small-company RUS data.[9] In all events, AT&T and MCI WorldCom recommend that the cost of switching (fixed plus variable) should not be permitted by the Synthesis Model to exceed $500 per line.[10]

Other Inputs Impacted by Switch Price Curve

The depreciation studies (and the adjusted RUS data) for switching include all investments necessary to make the switch operational. These costs include telephone company engineering and installation, the main distributing frame (MDF), protector frame (often included in the MDF), and power. To take advantage of the information about these ancillary costs implicit in these data, AT&T and MCI WorldCom propose that the costs of MDF, power and telephone company engineering and installation remain as part of the total switch price for cost modeling purposes. To accommodate this augmentation implicit in the input data, the HAI 5.0a input values for these switching cost components must be set as follows to avoid double counting these investments.

HAI 5.0a Input Name	HAI Input #	Value
MDF/Protector Inv. per Line	B79	$0.00
Switch Installation Multiplier	B81	1.0
Power (all 5 inputs)	B88	$0.00

Turner Plant Index/ Telephone Plant Indices

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data set available here appears to be insufficient to permit statistical identification of these finer cost distinctions.

[9] See charts labeled Public Data Switch Price Points Per Line

[10] If the Synthesis Model uses any linear equation for switching costs, extremely high switching costs will be generated for "wire centers" with small numbers of lines. Because switching costs in excess of $500 per line are likely not representative of efficient forward looking engineering practice, AT&T and MCI WorldCom recommend that the Synthesis Model permit no wire center to exceed $500 per line in total switching cost.

Staff has asked for comments regarding the appropriateness of the Turner Plant Index. AT&T and MCI WorldCom do not support the use of data adjustments based on the Turner Price Index, or other similar telephone plant indices. This is because these indices are only accounting mechanisms, and do not adequately capture the change in telephone switch prices over time for forward-looking economic cost purposes. This is evident from BellSouth's discussion of the TPI: "It should be noted that TPI forecasts are forecasts of installed equipment price changes. They are not intended to be forecasts of technology changes or productivity improvements."[11] Simply restating the historical costs of embedded technology will not capture the huge capacity increases and equipment component price decreases that have occurred in the electronics industry and the switch industry in particular.

One example of such an uncaptured technology change can be found in trunk terminating equipment. Recent trunk terminating equipment can terminate twice as many trunks, with no corresponding doubling in the price of this equipment relative to older equipment. Thus, the cost per trunk has declined significantly. In addition to technological improvements, the switch manufacturers have been adding functionality that make new switch installations more efficient, thereby increasing productivity. Because the TPI is defined to ignore technological improvements and productivity gains, the TPI will misestimate price trends of switching equipment.

The FCC's statistical approach of restating all switch investments to 1997 dollars is appropriate, especially when the adjustments are made to the regression forms proposed above. It is reasonable, however, that price declines not be trended significantly beyond the data period because other data suggest that the historically large percent price declines seen in recent years may not continue.[12]

DLC Credit

Terminating GR303 IDLC lines is significantly less expensive than analog lines.[13] This is due primarily to [1] the elimination of a MDF and protector frame termination, and [2] the economic efficiencies of terminating multiple lines on a DS-1 trunk termination instead of individual analog line terminations.

But even in the recent RUS and depreciation data on switch installations, the percent of DLC lines deployed is much less than is engineered by any of the TELRIC cost models. Thus, the switch cost information provided in the RUS and depreciation data do not reflect adequately the cost savings that would be realized if 60+% of lines are terminated on DLC – as occurs in the TELRIC models. Hence, the forward-looking switch investments for these models need to be adjusted downward from what is implied by the RUS and depreciation data to reflect the larger fraction of DLC lines that they engineer.

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[11] BellSouth USF Responses to FCC Staff Questions of June 25, 1998 filed 8/7/98. Question 2, page 1 of 2.

[12] The NBI report shows this trend attenuating as well.

[13] Petzinger Supplemental Direct Testimony in Rhode Island UNE proceeding, Docket 2681, November 10, 1998, indicated that port costs decreased by as much as 67%.

Because the gross switch cost "credit" for terminations on DLC should be approximately $20.00 per line,[14] but the average fraction of DLC in the historical data is roughly 15% (or one quarter of the 60+% DLC usage engineered in the HCPM),[15] AT&T and MCI WorldCom recommend that the "net" DLC credit be $15 per line.[16]

Switch Capacity Constraints

AT&T and MCI WorldCom recommend increasing the switch line and traffic capacity constraints to conform with more recent switch vendor-publicized capacities.[17] AT&T and MCI WorldCom's original values for call attempts, CCS and line capacities are now dated, and too conservative relative to current technology. Thus, we recommend that these capacities be increased according to the vendor publicized capabilities, as shown in the attached table.

SS7-Related Investments

AT&T and MCI WorldCom's initial values for the STP and SCP investments were obtained from a 1994 AT&T capacity study. Although it is certain that these signaling investment costs have come down substantially in recent years – due to increasing competition among SS7 equipment manufacturers, improvements in technology, and scale economies engendered by the huge increases in demand for SS7 equipment resulting from CLASS and 800 number portability and the current SS7 deployments for local number portability, AT&T and MCI WorldCom had no alternative information on prices. BellSouth has provided price information that is substantially lower than AT&T and MCI WorldCom's now dated estimates.[18] We propose that BellSouth's prices be adopted. These are included in the attached table of recommended changes to the inputs.

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[14] Of this $20.00 savings, $12.00 arises because MDF/Protectors are not needed in the switch for incoming lines terminated on DLC because these "lines" are terminated on switch trunk equipment and not line equipment. In addition, multiple line cards are not needed at the switch because these are already provisioned with the DLC equipment. The remaining $8.00 results from further per-line efficiencies realized from terminating at the digital trunk level rather than at the analog line level (e.g., greater usage concentration, eliminated line cards and line units, and the relatively lower cost to terminate trunks carrying DLC lines compared to analog lines, etc.).

[15] 15%/60% = 25%.

[16] 25%*$20.00 = $15.00

[17] See Nortel and Lucent websites for line and call capacities (copies attached). The CCS capacity was increased proportionately to allow the larger number of lines and call attempts.

[18] BellSouth 8/7/98 Ex Parte re CC Docket Nos. 96-45 and 97-160, Attachment to Question 1.

Table

The following table identifies switch-related inputs that AT&T and MCI WorldCom propose be modified from the HAI original value.

HAI Input Name	HAI Input Number	HAI Original Value		Recommended Value	
Switch Real-time Limit, Busy Hour Call Attempts	B63	1-1000 lines 1,000-10,000 lines 10,000-40,000 lines 40,000+ lines	10,000 50,000 200,000 600,000	1-1,000 lines 1,000-10,000 lines 10,000-40,000 lines 40,000+ lines	200,000 200,000 1,000,000 1,000,000
Switch traffic limit, BHCCS	B64	1-1000 lines 1,000-10,000 lines 10,000-40,000 lines 40,000+ lines	30,000 150,000 600,000 1,800,000	1-1,000 lines 1,000-10,000 lines 10,000-40,000 lines 40,000+ lines	800,000 800,000 5,000,000 5,000,000
Switch maximum equipped line size	B65		80,000		100,000
MDF/Prot Inv. per Line	B68		$12.00	$0.00 (included in switch price)	
Analog Line Circuit Offset for DLC lines, per line	B69		$5.00		$15.00
Switch installation multiplier	B70		1.10	1.0 (included in switch price)	
End Office Switch Inv. Constant	B71	BOC and large ICO Small ICO	$242.73 $416.11	Replaced by Host and Remote fixed and variable coefficients	
EO Switch Inv. Slope Term	B72		-14.922	Replaced by Host and Remote fixed and variable coefficients	
Power Investments	B77		$5,000-$250,000	$0.0 (included in switch price)	
Min. STP Inv., per pair	B153		$1,000,000		$224,000
Line Term, Both Ends	B154		$900		$725
SCP Inv./Transaction/Second	B163		$20,000		$2,444
Host Fixed (Constant)			Multiple values*		$290,487
Host Variable per Line			Multiple values*		$83
Remote Fixed (Constant)			Multiple values*		$147,078
Remote Variable per Line			Multiple values*		$83

*The former values are not shown as they are not defined the same for the new values. In addition to the definition of the various line sizes being changed, the proposed recommended values include telephone company engineering, installation, MDF, Protector and Power. In addition, the new values incorporate the data used in the Proposed FCC switch price estimates from both large and small companies, making separate small and large company coefficients unnecessary.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	89.4%
R Square	80.0%
Adjusted R Square	79.9%
Standard Error	1,748,736
Observations	1,288

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	5	1.56371E+16	3.13E+15	1,023	0
Residual	1,282	3.92045E+15	3.06E+12		
Total	1,287	1.95576E+16			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	547,317	496,595	1.10	0.27	(426,911)	1,521,546	(426,911)	1,521,546
lines	505	34	14.97	0.00	438	571	438	571
host/sa	3,611,444	1,043,123	3.46	0.00	1,565,028	5,657,861	1,565,028	5,657,861
LN(time)	(156,147)	246,192	(0.63)	0.53	(639,130)	326,836	(639,130)	326,836
Lines * LN(Time)	(164)	16	(10.17)	0.00	(196)	(133)	(196)	(133)
Host * LN(Time)	(1,351,938)	521,680	(2.59)	0.01	(2,375,378)	(328,497)	(2,375,378)	(328,497)

Alpha	547,317
Beta 1	505
Beta 2	3,611,444
Beta 3	(156,147)
Beta 4	(164)
Beta 5	(1,351,938)

	Calculated for *1997*
Host Constant (*A1*)	290,601
Remote Constant (*A2*)	146,808
Host/Remote per line variable cost (*B*)	83

who, what, where

product overview

Lucent Technologies
Bell Labs Innovations

Systems for Network Operators

Switching and Access Solutions

Switching Systems
For more information go to www.lucent.com/netsys/5ESS/products.html

5ESS® AnyMedia™ Switch
is a multi-service, software-based digital switching system designed to evolve with the changing needs of communication service providers, and features the following:

- **High Reliability:** The 5ESS AnyMedia Switch has the least amount of downtime of any switch in its class according to analysis of the latest U.S. FCC reports. The reports reveal that among four major switch vendors, the 5ESS Switch was the most reliable in four standard performance categories and set new benchmarks in two key areas.
- **Modular Design:** The switch's design sets it apart from all others with its intelligence being spread out into modules. This unique architecture allows growth in increments simply by adding modules. Separate modules, rather than entire switches, can be dedicated to specific services, such as long distance. Therefore, adding new services when and where the provider needs to, becomes quick and easy. Also, remote switch modules can be located up to 600 miles from the host switch, making it easy to enter new territories. Basically, the switch supports any network strategy without locking the service provider into a specific future and without interrupting current services.
- **Market Leadership:** With an embedded base of more than 104 million lines and 48 million trunks served by four thousand host switches in more than 50 countries worldwide, the 5ESS Switch is a market leader. A full-sized 5ESS serves up to 200,000 subscriber lines and over 100,000 trunk lines, with flexibility to meet the most diverse business needs.

5ESS Switch Compact Digital Exchange (CDX)
A smaller sized configuration serving up to 37,000 lines, ideal for rural areas or campus locations offering voice, video, or data services.

5ESS Switch Very Compact Digital Exchange (VCDX)
The smallest configuration serving up to 20,000 lines with the same services, quality and reliability as the full sized 5ESS Switch.

PacketStar Gateway Solution
provides a single virtual transport system to interconnect voice and data applications, and thus allows signaling information to be carried from the voice network through the packet data network. This system increases the

amount of traffic that can be carried over data networks and greatly simplifies operations by managing broadband pipes rather than individual trunk groups. Service providers use Packet Star Gateway Solutions to simplify long distance/toll voice and data network operations. This gains them cost savings and generates new revenue.

AnyMedia MultiService Module (MSM)
Integrated in the 5ESS Switch, the MSM is the bridge from the public switched telephone network to various data networks such as the Internet or ATM networks. Service providers with a 5ESS Switch now can quickly and easily offer Internet access, Internet telephony services, or other popular data services, while simplifying network operations and protecting current investments.

AnyMedia Express Access Interface Unit (AIU)
A virtually non-blocking line unit, the AIU relieves line-side congestion problems caused by long hold-time calls such as those to the Internet or data networks. When long hold-time callers are moved to the AIU, they get a direct one-to-one connection, rather than tying up circuits traditionally shared with other callers.

AnyMedia Switching Software
Lucent delivers software releases for the 5ESS Switch on an ongoing basis to help service providers speed deployment of new services such as long distance, Centrex, number portability, and ISDN PRI enhancements and other residential and business services.

Access Systems
For more information go to
www.lucent.com/netsys/supercomm/access8.html

AnyMedia Access System
is Lucent's third generation digital loop carrier that contains the application packs and software to deliver voice and data services. Versatile because of its small size, an AnyMedia Access System can be deployed in a central office, remote terminal or even outside plant environments. As a global open platform, the AnyMedia Access System supports standard network interfaces, including TR303/08 and V5, so it can connect to any switch. The AnyMedia Access System also uses Lucent's AnyMedia "plug and play" application packs-cards that let service providers "plug-in" applications as the market demands them, adding broadband services like ADSL incrementally.

SLC®-2000 Access System
is a multi-service digital loop carrier platform which has an integrated SONET OC-1, 3 and 12 multiplexer backplane that allows the service provider to integrate analog modem traffic, Integrated Services Digital Network (ISDN) and Digital Subscriber Line (xDSL) technology over a single access architecture.

SLC® ConnectReach™ Access System
is a multiservice access solution providing 24 FX voice lines, PBX routing capabilities and 10baseT LAN interfaces. It resides on the customer's premises and integrates voice and data traffic of a small to mid-sized business onto a single T1 line that connects directly to a SLC-2000 Access

System.

SLC® Series 5 Carrier System
is a full service digital loop carrier designed to support residential and business markets. Each Series 5 system dual channel bank (DCB) provides 192 channels of service. Currently, this carrier system offers over 130 DSO services deployable on T1, DSX-1 or fiber via outboard facilities, everything from POTS to ISDN and xDSL.

SLC® LineReach™ Access System
is a small line size digital loop carrier system that interfaces directly with a switch and provides a variety of standard and special voice services to small residential and business serving areas requiring 48 lines or less.

Multi-Service Distant Terminal (MSDT)
is a Fiber-in-the-Loop (FITL) extension of the SLC-2000 Access System or SLC Series 5 Carrier System targeted to residential and small business applications that provides rich narrowband services at a low cost and in a compact, modular design.

DDM-2000 FiberReach Narrowband Shelf
is an extension of the SLC-2000 Access System targeted to residential and small business applications that provides rich narrowband services at a low cost and in a compact, modular design.

ADSL Portfolio
For more information go to www.lucent.com/gsp/www/w5h.html

The portfolio includes a common integrated platform for new builds, lines served off of embedded base Central Office (CO) and Digital Loop Carrier (DLC) equipment, solutions for data network overlays and a standalone Digital Subscriber Line Access Multiplexer (DSLAM). The portfolio also features a common element management system.

- **ADSL for the AnyMedia Access System** Using ADSL application packs that fit in the AnyMedia Access System in both CO and Outside Plant environments, this solution supports both Full-rate and Lite versions of ADSL using ATM over DMT.

- **ADSL for the 5ESS AnyMedia System** Using ADSL application packs that fit in the 5ESS Switch-Integrated AnyMedia Express module, this solution supports both Full-rate and Lite versions of ADSL using ATM over DMT.

- **5ESS® LinkReach™ Access System** Using a switch-integrated Westell SuperVision™ shelf, this ATM over DMT solution supports both Full-rate and Lite versions of ADSL.

- **SLC LinkReach™ Access System** Plug-in channel units for Lucent's SLC-2000 and SLC Series 5 Access Systems that support Full-rate and Lite version of ADSL using ATM over DMT.

- **DSLAM LinkReach™ Access System** A standalone, CO-based DSLAM that supports Full-rate and Lite versions of ADSL using

ATM over DMT.

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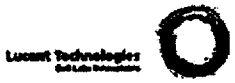

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Public Carrier Networks

DMS Core Central Processor

DMS-Core is the central processing unit (CPU) and memory of the system, handling high-level call processing for circuit-switched voice and data calls. To allow network providers to capitalize on their most powerful resource - the central office switch - the DMS SuperNode architecture is designed around a distributed processing strategy, allowing many processing tasks to be shared among various application and peripheral processors. System peripheral modules, for instance, relieve the DMS-Core computing module from the overhead of many routine call processing and supervisory tasks.

At the center of DMS-Core design strategy is the use of commercially available microprocessors, allowing it to evolve and incorporate the latest advances in processing technology as they are introduced. In addition, because the DMS-Core accommodates a range of Motorola microprocessors, the DMS SuperNode system is available with increasing levels of DMS-Core processing power, enabling network providers to select the specific processor for their application.

As increased service demands and capacity requirements warrant, the DMS-Core can be easily upgraded from the entry level processor (Series 10) to increasingly more powerful processors (Series 20-60).

- **DMS SuperNode Series 10** - Supports 200,000 Busy Hour Call Attempts (BHCAs) for plain old telephone service (POTS).
- **DMS SuperNode Series 20** - This baseline processor for the DMS and S/DMS Super-Node program supports 440,000 BHCAs. It achieves 2.0 to 2.2 times the capacity of the original NT40 based DMS-100 processor.
- **DMS SuperNode Series 30** - Supports 660,000 BHCAs, over three times the performance of the Series 10 processor.
- **DMS SuperNode Series 40** - Supports 800,000 BHCAs, repre-senting a four times performance improvement over the Series 10 processor.
- **DMS SuperNode Series 50** - The Series 50 BNR Reduced Instruction Set Computing (BRISC) processor, based on Reduced Instruction Set Computing (RISC), will support 1,200,000 BHCAs.
- **DMS SuperNode Series 60** - The Series 60 employs the BRISC pro-cessor and enhanced memory that uses "burst-mode" protocol to sup-port 1,400,000 BHCAs.

Reliability - DMS-Core is fully-duplicated - both planes of DMS-Core are simultaneously processing each call, allowing the "standby" plane to immediately takeover the call processing - with no loss of service - if the primary plane should fail.

The DMS-Core comprises two System Load Modules (SLMs) and two Computing Modules (CMs).

Computing Module (CM) - The Computing Module provides call-handling and processing power for the DMS SuperNode system. Within the CM are the CPU with system memory and a Message Controller (MC) that provides the communications link to DMS-Bus.

System Load Module (SLM) - The SLM stores office images and is used to load new software loads or stored images into DMS-Core. There are usually two SLMs in the bottom shelf of the DMS SuperNode cabinet, duplicated for reliability. As a direct pipeline to the switch, the SLM is an extremely high-speed tool for loading the switch and peripherals with new software, backing up the system memory, dumping images of system operating data, and emergency loading of the DMS-Core in case of on-line problems. Each SLM consists of one tape cartridge drive, a high-capacity disk drive, and a controller card. The SLMs are connected to the Computing Module of the DMS-Core with a Small Computer System Interface (SCSI) connector.

More specialized modules such as the Link Peripheral Processor (LPP) allow network providers to incrementally add processing elements to their system.

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Remote Access

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While new businesses, shopping centers, and residential developments fuel the demand for new revenue-generating services, the pressure of rapid growth requires flexible solutions to extend these high-demand services to remotely located areas - and into new markets - simply and quickly.

Nortel's remote access vehicles offer cost-effective solutions for this ever-changing environment, delivering DMS host services to remotely located subscribers. These solutions offer pair gain and feeder relief by minimizing the number of links back to the central office through concentration and intraswitching at the remote terminals. And, by extending the reach of DMS technology, these remote switching solutions provide a powerful platform for digital integration, network simplification, exchange area consolidation, and penetration into new markets or territories.

Nortel's portfolio of remote access products includes two distinct types of network elements:

Switch Remotes

Switch remotes extend DMS-SuperNode or DMS-10 host switch services while offering intra-switching and emergency stand-alone operation - and in some cases, offer the option to grow into a full DMS switch. For the DMS SuperNode and DMS-10 systems, Nortel offers the following switch remotes:

- **Remote Switching Center-S (RSC-S) for the DMS SuperNode and the DMS-10**, supporting up to 6,400 lines or 480 trunks to serve locations up to 650 miles from the switch (4480 lines, 100 miles with DMS-10). Available in a single-cabinet start-up version that supports up to 640 lines, the RSC-S can grow into a dual RSC-S, or even to a full-sized DMS-100 office.
- **Dual RSC-S for the DMS SuperNode**, supporting more than 10,000 lines or 960 trunks to locations up to 650 miles from the switch. Both the Dual RSC-S and the RSC-S can serve as hosts for RLCMs and OPMs in "remote-off-remote" configuration and for TR-08 digital loop carriers.
- **Remote Line Concentrating Module (RLCM) for the DMS SuperNode**, extending DMS services up to 100 miles from the host switch to up to 640 subscriber lines. This remote is architecturally equivalent to the DMS-100 Line Concentrating Module (LCM) peripheral, which reduces inventory requirements.
- **Outside Plant Access Cabinet (OPAC) for the DMS SuperNode**, essentially an RLCM that can be placed outdoors. The OPAC eliminates most construction costs associated with conventional remote sites, and opens up many unconventional and inexpensive deployment opportunities, such as rooftops, parking garages, and inside office buildings.

- **Remote Subscriber Line Equipment (RSLE)** for the DMS-10, the largest member of the DMS-10 family of remotes, supporting up to 1,024 lines up to 100 miles from the central office
- **Remote Subscriber Line Module (RSLM) for the DMS-10**, supporting up to 192 subscriber lines, up to 100 miles from the DMS-10 host.
- **Outside Plant Subscriber Module (OPSM) for the DMS-10**, an RSLM in an self-contained, environmentally protected stainless steel cabinet for outdoor locations.

Remote Access Vehicles

Remote access vehicles include digital loop carriers, "next generation digital loop carriers," and sophisticated servers for ISDN and wideband business services:

- **AccessNode** systems, simultaneously supporting narrowband, wideband, and broadband services - from DS-0 to OC-3 subscriber interfaces - with fiber or copper links to digital or analog switches. With unique service-adaptive line card technology (which allows provisioning to be performed from a remote position through software) AccessNode addresses a major concern of network providers - the high cost of service calls to provision and maintain subscriber services.
- **AccessNode Full Services Terminal (FST)**, offering a cost-effective means of extending up to 48 or 96 lines of AccessNode capabilities to remote locations. In wall-mounted or cabinetized packages, the FST is an ideal low-risk vehicle for entering new markets, especially where growth projections are conservative.
- **AccessNode Fiber Distribution System-One (FDS-1)**, using low-cost optical network units to deliver "fiber to the curb" to locations up to 75 miles from the AccessNode network element or host switch. Using a counter-rotating fiber ring architecture, this system provides route diversity for protection against cable cuts or other network faults.
- **DMS-1 Urban**, the industry's premier digital loop carrier, supporting up to 544 lines in a universal configuration and up to 528 lines in an integrated configuration (directly interfaced to the digital switch through a subscriber carrier module in the host office)

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BEFORE THE RHODE ISLAND PUBLIC UTILITIES COMMISSION

DOCKET NO. 2681

SUPPLEMENTAL DIRECT TESTIMONY OF

CATHERINE PETZINGER

ON BEHALF OF

AT&T COMMUNICATIONS OF NEW ENGLAND, INC.

(NON-PROPRIETARY VERSION)

NOVEMBER 10, 1998

III. OTHER SCIS INPUT PROBLEMS THAT CAUSE INCORRECT RESULTS

Q. WHAT INPUTS SHOULD BE CHANGED TO REFLECT FORWARD-LOOKING TECHNOLOGY?

A. The Bell Atlantic digital loop carrier inputs to SCIS reflect old technology. As specified throughout Bell Atlantic's contracts, TR303-compliant digital loop carrier (i.e., Next Generation Digital Loop Carrier – NGDLC) has been available for years. NGDLC is universally accepted in the industry to be the forward-looking technology. Despite Bell Atlantic's claims that GR303 (also known as TR303) NGDLC has not been approved and is not currently being deployed, Bell Atlantic does recognize it as a forward-looking technology. This is evident in NYNEX's Request for Proposal to Nortel for switching that states: **[start proprietary].[end proprietary]**[10] All of the old-technology digital loop carrier line inputs should be changed to be GR303 NGDLC lines as inputs to SCIS.

Q. WHAT WOULD BE THE IMPACTS OF USING NGDLC COSTS IN PLACE OF OLD-TECHNOLOGY DLC?

A. Using Bell Atlantic's SCIS program for the Riverside office, I replaced the old-technology digital loop carrier inputs with NGDLC inputs.[11] The results are as follows:

[start proprietary] [end proprietary]

Based on this analysis, we would expect the digital port costs to decrease by 67%.

Q. WHAT OTHER INPUTS SHOULD BE CHANGED TO REFLECT FORWARD-LOOKING TECHNOLOGY?

A. Bell Atlantic has assumed all copper-based remote switch modules for the 5ESS switch. Eighty-nine percent (89%) of all remotes in Rhode Island are 5E remotes. These remotes

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[10] NYNEX RFP 92-0711JJB to Nortel, page 55 of 106 provided in Bell Atlantic's second supplemental response to AT&T7-12 provided on October 8, 1998.

[11] See Exhibit CEP5 for the SCIS inputs and outputs of the original Bell Atlantic Riverside office and the results for the Riverside office with NGDLC (TR303) line inputs.

Public Data Switch Price Points Per Line

$/Line	Source	Comments	Cite
$85/$115/$140	Southwestern Bell	Prices based on line sizes >40K, 15-40K, and 1-15K, respectively	Hugh W. Raley Direct Testimony in TX PUC Docket 16189, 16196, 16226, 16285, 16290
~$50	Nortel/US West	Contract in excess of $100 million for 2.2 million lines announced on Nortel Website (at $50 per line, would equal $110 million)	Nortel News Release 6/16/97, on www.nortel.com/home/press
$120	Sprint	$150K fixed + $110 per line for $120 per line for 15K line switch	Sprint's Hanna ex parte letter 3/24/97 in CC Docket No. 96-45
$70	Pacific Bell		Prof. Jerry Hausman Testimony for Pacific Bell, 4/8/98, Pg. 8 in CA PUC, later removed from transcript as not pertaining to issues under review

Additional General Switch Information

Pricing Data	Source	Comments	Cite
Digital Switch Prices Continue to Decline even after analog switch replacements	Bell Atlantic	Declining switch prices are not due solely to analog switch replacement contracts, but reflect overall trend in industry	Opposition of BA to Petitions to Suspect and Investigate in 1998 annual Access Tariff Filings, 6/26/98
Digital Switch Prices Declining nearly 8% per year	Pacific Bell	Compare to conservative 3% decline cited by NBI study.	Prof. Jerry Hausman Testimony for Pacific Bell, 4/8/98, in CA PUC, later removed from transcript as not pertaining to issues under review

Additional General Switch Information (Cont'd)

Pricing Data	Source	Comments	Cite
HM Switch Curve Results High, but Acceptable	Minnesota PUC	Staff's consultant was "knowledgeable of actual switching costs through his familiarity with Ameritech's switch contracts, his knowledge of the switch contracts of other RBOCs, and because he reviewed US WEST switch contracts in connection with his work for the Department" and recommended HM switch curve even though it was "conservative"	Report of the ALJ on Selection of Cost Study for MN PUC In the Matter of the State of Minnesota's Possible Election to Conduct its own forward-looking economic cost study to determine the appropriate Level of Universal Service Support., 4/2/98.
New Switch Prices, and not growth prices, are Appropriate for TELRIC	Sprint/Carolina Telephone/Central	New switches prices (often lower than prices for growth equipment) is the correct price to use for TELRIC	Bill Bollinger Supplemental Direct Testimony before NC PUC 2/16/98.

	Telephone		

TX 09-09-02 AR

DOCKET NOS. 16189, 16196, 16226, 16285, 16290

SOUTHWESTERN BELL TELEPHONE COMPANY

DIRECT TESTIMONY

OF

HUGH W. RALEY

PUC Issues

VII.(j)(2) Central Office Plant Inputs to the Hatfield Model

September 6, 1996

Q. **WHAT OTHER PROBLEMS HAVE YOU IDENTIFIED?**

A. The biggest problem with the Hatfield Model, in my opinion, is the basic assumption that the entire network would be put out for bid at one time. This is totally impractical and results in an unrealistically low price for major network elements such as switches. However, even if you accept that unrealistic premise, the model inputs for switching are perilously understated.

For example, the Hatfield Model shows a price of $59 per line for a large switch. In several recent bids for switches in this size range, the "Engineered, Furnished and Installed" (EF&I) price was $85/line. In addition, if you add telephone company cost plus tax, you arrive at a total of $109/line. If you then add frame, power and test sets, you have a total cost of $183/line. This is using the Hatfield Model assumption of simultaneous replacement. SWBT's average growth cost per line on a digital switch is $248/line. It appears that the Hatfield Model may be only considering bid prices (and even then the costs shown are unrealistically low), ignoring the associated costs for the installation and testing of the switch.

I have attached an exhibit which shows recent actual bid prices versus recent actual growth prices for common units of central office equipment. Even just looking at the bid price scenario, the Hatfield Model is very unrealistic for most types of equipment. Below I give a comparison of some of these differences:

NETWORK DEPLOYMENT COST ANALYSIS
SOUTHWESTERN BELL TELEPHONE COMPANY

- Average New Digital Switch Cost Per Line

	Digital Lines					
Cost Per Line	0 - 15,000		15 - 40,000		40 - 80,000	
Digital Switch	Capital	Expense	Capital	Expense	Capital	Expense
EF&I	140	14	115	11	85	8
Telco & Tax	39	1	32	1	24	1
TOTAL	179	15	147	12	109	9
New COSMIC Frame	58	0	58	0	58	0
Power & Emgy Engine	26	0	24	0	15	0
Test Sets	5	0	2	0	1	0
TOTAL	268	15	231	12	183	9

Per line cost based on the following switch sizes:

0 - 15,000 ~ 7,703 lines
15 - 40,000 ~ 21,062 lines
40 - 80,000 ~ 53,653 lines

Note: Switch cost exclude transmission equipment (umbilical), Network Operations conversion, OSP Cost splicing and equipment side half tap

- Average Digital Switch Growth Cost (Including EF&I, Telco and Tax)
  - ⇒ $ 248 / Line ($ 225 Capital, $ 23 Expense)
  - ⇒ $ 517 / Trunk ($ 470 Capital, $ 47 Expense)

- Average New Tandem Total (Typical Size ~ 55,000 Trunks)

Description	Capital	Expense
Digital Switch	4.3	0.9
End Office Trunking	4.7	0.8
Power	1.0	0.0
Transmission Eqpt	1.0	0.0
Ntwk Operations	0.0	0.6
TOTAL	11.0	2.3
Cost/trunk	$200	$42

Note: Operations expense includes cost of conversion, translations and training

- Average Tandem Growth Cost
  - ⇒ $ 517 / Trunk (Assume same as trunk growth cost for End Office switch)

- Average STP Pair Total Cost

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bid comprise? What were they bidding on?
A It was an EF&I – engineering, furnish and install – price for a switch of - in the size range between forty and eithty thousand lines. It was for the switch itself. It did include, you know, the processor and line termination and the trunk terminations. It was the entire switch.
Q Okay, did the bid contemplate doing anything with the existing switch?
A No.
Q Did the bid include the switch port?
A The switch port? I'm sorry. I don't know what a switch port is.
Q Okay, so you don't know whether it included it or didn't include it presumably?
A Well, were you asking on the 85-dollar line bid?
Q Yes, sir.
A That bid included everything that is required to make the switch work. So when you say "switch port," that's a little

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generic for me. There are lines, and there are trunks, and they could either one be considered ports. So I didn't know which one you were talking about.
Q Did it include a trunk port —
A Yes.
Q — at $85 a line?
A Yes.
Q Is there such a thing as a line port?
A Well, that's not a nomenclature that I'm used to dealing with, but you could look at it that way, yes.
Q Do you-all have a fancy name for what I would call a line port?
A Well, actually I would just call it a line.
Q A line? Okay.
A I call it line and trunk and port. Some people, I guess, use that, but that's not the common nomenclature for us.
Q Okay, now, the $85 a line that you reference in your testimony - was that the low bid price?
A No, that was the average.

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Q What was the low bid price? I'm going to ask you the question without identifying the particular vendor.
A I would be very uncomfortable answering that because of confidentiality.
Q Well, then let's —
MS. HUNT: Let's go off the record a second. I think we have a misunderstanding as to what is being asked. Can we go off for one minute?
MR. DAWSON: Let's go off the record. That's fine.
(Discussion off the record.
Q (By Mr. Dawson) Tell me - explain to me what the $85 a line represents.
A The $85 a line – I thought I had done that, but it's the EF&I costs - engineering, furnish and install costs for the switch that includes the lines, the trunks, the fabrics, the processors - the total price from a vendor standpoint divided by the number of lines on the switch.
Q And with respect to the bids,

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that is the average price over the various bids that Southwestern Bell accepted during the time period that you referenced earlier?
A That's correct.
Q Do you know whether there were any instances where Southwestern Bell chose not to accept the lowest bid offered to it for any reason?
A I do not know. I would be surprised.
Q And do you know whether those bid prices included the vendor discount?
A Yes, they did.
Q You then talk about telephone company cost plus tax?
A Yes.
Q Where did you get that information?
A The information on switch cost, I'd say just in general, came from Gary Shaw, an employee of Southwestern Bell in Dallas, in the network planning organization.
Q Back to the bid information,

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where did you get that? Is that from Mr. Shaw also?
A That's correct.
Q And Mr. Shaw - you're relying on him for the numbers that were used for the telephone company cost?
A That's correct.
Q Would that also be true for the frame, power and test sets?
A That's correct.
Q Do you know, sir, whether there were any documents that would substantiate the numbers that are contained on Page 7 of your testimony?
A Yes, I believe so. At the time I did the testimony, I was in telephone contact with Mr. Shaw and actually some others, although Mr. Shaw was the one that put it together for me. After the testimony had been filed, he has sent me some confirming correspondence of where he got some of these numbers from and their basis and all. So I believe that that probably satisfies what you're asking for there.

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Q Well, what I'm trying to understand, sir, is you've got a bunch of numbers in here, and I'm not being critical, but where did they come from? All you've told me so far is Mr. Shaw. Do you happen to know where he got them from?
A Oh, yes.
Q Where did he get them from?
A Mr. Shaw - his job responsibilities include doing fundamental switch planning for the state of Texas. He's the individual that does - he and his people do analysis that justify replacing the switch. They are the ones that arrange to bid it with the vendors. They're the ones that track it on what it actually costs. So he has a - he is a rich source of factual information on the cost of switching.
Q And do you expect that Mr. Shaw has available to him documents that would support the $85 a line bid cost that you reference in your testimony?
A I would assume so.
Q Would you expect that Mr. Shaw has available to him documents which would support or substantiate the total company cost that's referenced in your testimony?
A Yes, I do.
Q And the same for the frame, power and test sets?
A Yes.
Q And to your knowledge, sir, have any of those documents been either produced in this proceeding or made available to any of the parties?
A They have not.
Q Then you say later in the paragraph beginning on Line 13 - you say, "Southwestern Bell's average growth cost per line on a digital switch is $248." Do you see that, sir?
A Yes, I do.
Q First of all, what is an average growth of the cost per line on a digital switch? What are you referring to there?
A The reference is basically the same as the $59 or $85 a line cost. If you took the - on a normal growth job on a digital switch -- and we use that to be

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forward looking -- this is what the average cost per line is for a total job.
Q Let me back up. The bids that you received - were they for analog or digital switches?
A Digital.
Q Okay, and that gives you a total cost of $183 a line?
A For a new switch.
Q For a new switch? All right, and is this what you're saying for an existing digital —
A Growing an existing digital switch costs 248, and that's - again, that is illustrating what I was discussing earlier of the cheapest you ever get the switch is at the initial point. Growth jobs cost you a bit more.
MS. HUNT: And I would caution here to be real careful not to talk over and let him finish the question because the court reporter has a hard time getting both down if you talk over each other.
Q (By Mr. Dawson) Okay, what's the

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network, you've got - a certain percentage of your switches at any given time are relatively new switches. There's no economic incentive to replace them. So if you assume that the total demand that you're trying to satisfy is going to be handled by bid switches, dial-to-dial replacements on everything that's out there, no one would even remotely consider doing that.

Q Okay, anything else?

A That's the primary point there.

Q Okay, beginning on Line 8, you say that the Hatfield model shows a price of $59 per line for a large switch. Do you see that?

A Yes.

Q Did you get that out of the Hatfield model itself?

A Out of the input, yes.

Q Okay, do you know what that 59-dollar charge refers to? In other words, let me put it this way: Do you know whether that includes or does not include the switch port?

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A I did not know with any degree of certainty. When I read it, I assumed that it handled the line termination itself and the basic switching function of the switch involved, but it doesn't explain it one way or the other.

Q Okay, now, you then say in several bids EF&I price for switches at Southwestern Bell was $85 a line. Do you see that?

A Yes, I do.

Q Okay, first of all, what particular bids are you referring to?

A Basically it was bids on switches that we were replacing in Texas over the past year and a half, I believe it was, in that size range. We took a specific example there, and the Hatfield model had several sizes, and these were switches in the forty to eighty thousand line size, and this was the average bid in Texas over the last 18 months.

Q What switches were you receiving bids on?

A The name of the specific switch?

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Q Yes, sir.

A I do not recall.

Q You don't know if they were DMS-10s?

A Oh, you're talking about vendor? I thought maybe you were talking about location.

Q No, I didn't mean location. I meant the type of switch. There's like a DMS-10 and DMS-100 and 5E.

MS. HUNT: I'm going to caution here. Again, if we're getting into vendor-specific prices where you can really tell what their individual price is, we need to advise the court reporter and make arrangements.

Q (By Mr. Dawson) At this point, I'm not trying to get into prices. I just want to know which particular switches were you receiving bids on.

A Okay, I might have to rephrase it just a little bit.

Q Well, I don't —

A I think what you want to know is which vendors were we —

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Q What types of switches?

A — were we inviting to bid on these particular projects. Right?

Q And the types of switches you were asking them to bid on.

A Okay, well, they're not bidding on a type of switch. They are bidding a type of switch. You know, as an example, Lucent bids a 5ESS. Nortel bids a DMS-100 typically on — well, they really have virtually no choice in this size switch. That's the only one they could bid, and those are the two vendors that we have in this model.

Q Okay, so when you say - when you're referring to recent bids, are you referring to bids from Lucent and Nortel?

A That's correct.

Q And no others?

A That is correct. Let me clarify that. For the 59-dollar line - not the 59, but the 85-dollar line, that portion of it was just those. Some of the other stuff down here had other bidders involved in it.

Q And what was the - what did the

ITS

GTE Service Corporation
1850 M Street, N.W., Suite 1200
Washington, DC 20036
202 463-5200

213162

January 7, 1997

Mr. William Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W. - Room 222
Washington, D.C. 20554

Re: **CC Docket 96-45, Federal-State Joint Board on Universal Service**
Proxy Cost Models

Dear Mr. Caton,

GTE hereby submits responses to selected questions posed to proxy cost model proponents in the Public Notice, DA 96-2091, released by the Federal-State Joint Board on Universal Service on December 12, 1996. In addressing technical aspects of the proposed proxy models, GTE is not altering its basic position on their use, as expressed in GTE's Comments dated December19, 1996, on the recommended decision of the Joint Board.

Sincerely,

W. Scott Randolph
Director - Regulatory Affairs

cc: Docket 96-45 Federal State Joint Board and Joint Board Staff
Ms. Sheryl Todd, Universal Service Branch, 2100 M Street (computer diskette)
ITS

According to Mr. William L. Hahn, Inquiry Analyst at NBI, these prices represent the engineered, furnished and installed cost of new digital switches having a 5:1 line to trunk ratio (Telephone conversation with Dr. Lawrence P. Cole, GTE Laboratories Incorporated, October, 1996), but they do not include the cost of trunk ports (See letter to Ms. Robin Sanders, Bell Atlantic, September 20, 1996). This latter point is particularly relevant, because in Release 2, the "adjustment" that Hatfield Associates makes to the per-line prices contained in Exhibit 3.34 for 1995 is to subtract $16 per line for trunk ports, which then appears in the interoffice facilities module. But subtracting it from where it wasn't and adding it in elsewhere, still leaves it out.

As Mr. Hahn's letter to Ms. Sanders makes clear, the NBI estimates are not based on a model nor a lot a data. Rather, they are based on interviews with carriers and vendors by the NBI analyst (who is no longer with the firm), and on public contract announcements. There is no way of knowing what the carriers and vendors, both of whom normally regard prices paid for switches as highly proprietary, as has been demonstrated in several recent regulatory proceedings, revealed to the NBI analyst. But it should be possible to go back and look at public contract announcements in the period 1991-1994 and see what information they contained. Of particular interest would be the extent to which the contracts were for comparable packages of hardware, software and labor. One such announcement was made by Pacific Bell in January 1993. It covered 9 million lines and worked out to about $110 per line, but the contracts excluded investments for line terminations, main distribution frames, and fiber interfaces. Did the NBI analyst know this? What adjustments did he make for it? We simply don't know.

NORTEL
NORTHERN TELECOM

News Releases

June 16, 1997

Contact:

Joanne Latham
Nortel
919-992-7851
joanne_latham@nt.com

U S WEST Awards Switching Contract to Nortel (Northern Telecom)

DENVER, Colo. - U S WEST Communications recently entered into a multi-year contract with Nortel (Northern Telecom) to purchase Nortel's DMS central office switching upgrades for its network. The contract resulted from a competitive bid process used by U S WEST. It centers around replacing older analog switching technology with 2.2 million lines of Nortel's DMS-100 product. The multi-year contract is valued in excess of $US 100 million and was reflected in Nortel's recent announcement of $US 329 million of new business with a number of local and long distance companies.

The Nortel upgrade of analog systems in the contract means that U S WEST subscribers will be able to receive advanced digital features, such as ISDN, network business services, and advanced display services for both home and business.

To assist U S WEST in meeting future customer demands, Nortel will keep U S WEST's network ready for new services, such as Local Number Portability and for Advanced Intelligent Network (AIN) features, by providing memory capacity and processor upgrades to existing DMS-100 systems in the network over the next several years.

"Nortel is the only U S WEST supplier that provides both digital switching and SONET products," stated John Czak, Customer Supplier Team Executive Sponsor for U S WEST.

"We're honored to be selected by U S WEST as one of its major suppliers for the modernization of its network," said Craig London, vice president, Western Region, Nortel. "U S WEST has done an excellent job in providing its customers with the latest technology available today."

U S WEST Communications (NYSE: USW) provides telecommunications and high-speed data services to more than 25 million customers in 14 western and midwestern states. The company is one of two major groups that make up U S WEST, which is in the connections business - helping customers share information, entertainment and communications services in local markets worldwide. U S WEST's other major group, U S WEST Media Group (NYSE: UMG), is involved in domestic and international cable and wireless networks, directory publishing and interactive multimedia services.

Nortel Public Carrier Networks, a business unit of Nortel, is a supplier of telecommunications products and services to public carriers, including a full range of solutions for Internet access and

telecommuting, from analog access systems through advanced services like digital subscriber line and hybrid fiber-coax. Nortel Internet Thruway, announced in August 1996, is a multi-vendor solution for rapidly increasing modem traffic that can help to lower the cost of handling the traffic while allowing the public carrier to generate new revenue from ISPs.

Nortel had 1996 revenues of $12.8 billion and has approximately 68,000 employees worldwide.

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Federal Communications Commission
Office of Secretary

EX PARTE

March 24, 1997

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W. Room 222
Washington, D.C. 20554

RE: In the Matter of Federal-State Joint Board on Universal Service - CC Docket No. 96-45

Dear Mr. Caton,

On Friday, March 21, 1997, representatives of Sprint Corporation met with members of the Commission's Common Carrier Bureau and Office of General Counsel to discuss the use of proxy cost models in the above referenced proceeding. Representing the Commission were:

John Nakahata	C. Anthony Bush	Brian Clopton
Bob Loube	Jeanine Poltronieri	Bill Sharkey
Brad Wimmer		

Representing Sprint were:

Jim Dunbar	Warren Hannah	Jay Keithley
Jim Sichter		

Attachment A is a copy of the materials used in the meeting. Sprint urges the Commission to adopt the BCPM as the platform model for determining USF funding. The materials present Sprint's proposal for accomplishing this objective. The information provides results of the BCPM "run" with Sprint proposed inputs. This proposal, and the model input changes, represent the position of Sprint Corporation only, and not that of the other BCPM model sponsors.

Digital Carrier Cost Table

Cost for Digital Loop Carrier				
Dlc Fiber Size	FCC Filing Fixed Cost	FCC Filing Per Line Cost	Sprint Run Fixed Cost	Sprint Run Per Line Cost
0	$ 38,867.00	$ 92.81	$ 10,395.00	$ 250.00
49	$ 53,577.00	$ 92.81	$ 11,475.00	$ 250.00
121	$ 84,976.00	$ 92.81	$ 14,175.00	$ 250.00
241	$ 92,147.00	$ 92.81	$ 92,147.00	$ 92.81
673	$ 125,120.85	$ 92.81	$ 125,120.85	$ 92.81
1335	$ 217,267.85	$ 92.81	$ 217,267.85	$ 92.81

CO Switch Cost Table

Company Size	FCC Filing Fixed/Startup $	FCC Filing Per Line $	FCC Filing Power and Common Equipment %	Fcc Filing Telco Install and Engineering %	Sprint Run Fixed/Startup $	Sprint Run Per Line $	Sprint Run Power and Common Equipment %	Sprint RunTelco Install and Engineering %
S	$ 261,871.00	$ 225.00	6.82%	5.77%	$ 150,000.00	$ 110.00	6.82%	5.77%
M	$ 261,871.00	$ 225.00	6.82%	5.77%	$ 150,000.00	$ 110.00	6.82%	5.77%
L	$ 261,871.00	$ 225.00	6.82%	5.77%	$ 150,000.00	$ 110.00	6.82%	5.77%

Conduit Manhole Table

	FCC Filing				Sprint Run		
% Assigned Telephone	Cost of installed facility assigned telephone			% Assigned Telephone	Cost of installed facility assigned telephone		
	Normal	Soft Rock	Hard Rock		Normal	Soft Rock	Hard Rock
75%	$ 1,008.00	$ 1,158.00	$1,308.00	66%	$ 887.04	$ 1,019.04	$1,151.04
90%	$ 3,404.93	$ 3,764.93	$4,124.93	66%	$ 2,496.95	$ 2,760.95	$3,024.95
80%	$ 4,512.00	$ 4,832.00	$5,152.00	66%	$ 3,722.40	$ 3,986.40	$4,250.40
80%	$ 2,640.00	$ 2,800.00	$2,960.00	66%	$ 2,178.00	$ 2,310.00	$2,442.00
100%	$ 0.83	NA	NA	100%	$ 0.83	NA	NA

Buried Structure

Density Group 0-10

Buried Cable Installation	Normal Feeder FCC Filing % Assigned Telephone	Normal Feeder Sprint Run % Assigned Telephone	Normal Distribution FCC Filing % Assigned Telephone	Normal Distribution Sprint Run % Assigned Telephone	Soft Rock Feeder FCC Filing % Assigned Telephone	Soft Rock Feeder Sprint Run % Assigned Telephone	Soft Rock Distribution FCC Filing % Assigned Telephone	Soft Rock Distribution Sprint Run % Assigned Telephone	Hard Rock Feeder FCC Filing % Assigned Telephone	Hard Rock Feeder Sprint Run % Assigned Telephone	Hard Rock Distribution FCC Filing % Assigned Telephone	Hard Rock Distribution Sprint Run % Assigned Telephone
Plow	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Rocky Plow	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Trench & Backfill	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%
Rocky Trench	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%
Backhoe Trench	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%
Hand Dig Trench	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%
Bore Cable	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%
Push Pipe & Pull Cable	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%
Cut & Restore Asphalt	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%
Cut & Restore Concrete	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%
Cut & Restore Sod	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%	100.00%	66.00%

Density Group 11-50

Buried Cable Installation	Normal Feeder FCC Filing % Assigned Telephone	Normal Feeder Sprint Run % Assigned Telephone	Normal Distribution FCC Filing % Assigned Telephone	Normal Distribution Sprint Run % Assigned Telephone	Soft Rock Feeder FCC Filing % Assigned Telephone	Soft Rock Feeder Sprint Run % Assigned Telephone	Soft Rock Distribution FCC Filing % Assigned Telephone	Soft Rock Distribution Sprint Run % Assigned Telephone	Hard Rock Feeder FCC Filing % Assigned Telephone	Hard Rock Feeder Sprint Run % Assigned Telephone	Hard Rock Distribution FCC Filing % Assigned Telephone	Hard Rock Distribution Sprint Run % Assigned Telephone
Plow	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Rocky Plow	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Trench & Backfill	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%
Rocky Trench	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%
Backhoe Trench	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%
Hand Dig Trench	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%
Bore Cable	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%
Push Pipe & Pull Cable	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%
Cut & Restore Asphalt	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%
Cut & Restore Concrete	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%
Cut & Restore Sod	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%	97.50%	66.00%	95.00%	66.00%

Benchmark Cost Proxy Model Results

Area Wide Summary Report

National
Multiple States [50]

Investment Per Line Data	Uncapped Annual Amount	Capped[1] Annual Amount
Loop Investment	$ 947	$ 943
Switch Investment	$ 119	$ 119
IOF Investment	$ 4	$ 4
Other Investment	$ 67	$ 67
Total Investment	$ 1,137	$ 1,133
Expense Per Month Data		
Capital Cost	$ 17.86	$ 17.79
Operating Expense per Line	$ 11.34	$ 11.34
Total Cost per Line	$ 29.20	$ 29.14
Gross Receipts Tax[2]	$ 1.19	$ 1.18
Line Data		
Average Loop Length in Feet	17,273	
Lines Above $10K Loop Inv	132,299	
Number of Households	96,900,089	
Number of Residential Lines	109,771,932	
Number of Single Business Lines	12,866,289	
Multiple Business Lines	40,587,934	
Total CBG Lines Served	163,226,155	
Aggregate Support Data		
Support Over $20 Benchmark	$ 15,230,979,431	$ 15,120,870,243
Support Over $30 Benchmark	$ 8,431,506,350	$ 8,321,397,162
Support Over $40 Benchmark	$ 5,091,487,444	$ 4,981,378,256
Support Over $50 Benchmark	$ 3,031,058,347	$ 2,920,949,159
Support Over $60 Benchmark	$ 1,780,377,756	$ 1,670,268,568
Support Over $70 Benchmark	$ 1,101,013,503	$ 990,904,315
Support Over $80 Benchmark	$ 746,332,922	$ 636,223,734

[1] CBGs with Average Loop Investment per line over $10,000 are capped at $10,000

[2] Application varies so much on a state by state basis, it is not included in the Monthly Cost.

Assumptions:
SPRINTDISCOUNTBASE.CSV, CapcostSprintDiscount.inf
BCPMSprint.xls
USF with Sprint Discounted Cable Prices (0% discount applied)

TESTIMONY OF JERRY HAUSMAN

FOR PACIFIC BELL

APRIL 8, 1998

Testimony of Professor Jerry Hausman

April 7, 1998

1. Q. Please state your name and business address.

A. My name is Jerry A. Hausman. I am the MacDonald Professor of Economics at the Massachusetts Institute of Technology in Cambridge, Massachusetts, 02139.

2. Q. Please state your educational background and areas of teaching and research.

A. I received an A.B. degree from Brown University and a B.Phil. and D. Phil. (Ph.D.) in Economics from Oxford University where I was a Marshall Scholar. My academic and research specialties are econometrics, the use of statistical models and techniques on economic data, and microeconomics, the study of consumer behavior and the behavior of firms. I teach a course in "Competition in Telecommunications" to graduate students in economics and business at MIT each year. I am also the director of the MIT Telecommunications Economics and Business Research Program. I was a member of the editorial board of the Rand (formerly the Bell) Journal of Economics for the past 13 years. The Rand Journal is the leading economics journal of applied microeconomics and regulation. In December 1985, I received the John Bates Clark Award of the American Economic Association for the most "significant contributions to economics" by an economist under forty years of age. I have received numerous other academic and economic society awards. A copy of my curriculum vitae is attached as Appendix 1.

3. Q. Please describe your prior experience in telecommunications research.

A. I have done significant amounts of research in the telecommunications industry. My first experience in this area was in 1969 when I studied the Alaskan telephone system for the Army Corps of Engineers. Since that time, I have studied the demand for local measured service, the demand for intrastate

Bradley, Future Competition in Telecommunications, Harvard Business School Press, 1989, p. 204). Today, the prices of new AT&T 5-ESS switches and similar NTI switches are in the $70 per line or lower range.[6] A BOC who paid $200 per line made the efficient investment decision when it purchased its COS. But TELRIC, by omitting economic depreciation due to technological progress, leads to a systematically downward biased estimate of costs. Indeed, I have estimated the rate of price decrease of central office switches to be near 8% per year over the past five years, while the cost of fiber optic carrier systems has decreased at approximately 7% per year over the same period. The omitted economic factor δ can be quite large relative to r, the traditional ILEC cost of capital used by regulators, for telecommunications switching or transmission equipment due to technological progress. Thus, omitting the economic factor δ can lead to a significant underestimate of TELRIC. Prices set on the basis of the underestimated TELRIC will be too low, and the ILEC will be required to sell its unbundled elements at a price below their economic cost. This outcome will cause an inefficiently low level of investment by an ILEC because it will not recover its cost of investment. For existing plant and equipment the regulators will be requiring the ILEC to sell unbundled elements below the economic cost which can create financial problems for the ILEC and will discourage future investment because the ILEC will not have a credible commitment from the regulator that it will recover the cost of new investment.

13. Q. What is the third factor which TELRIC calculations omit?
A. TELRIC calculations recognize the fixed nature of much investment in telecommunications networks, but TELRIC calculations fail to recognize the sunk and irreversible nature of many investments in telecommunications networks.[7] TELRIC makes no allowance for the sunk and irreversible nature of

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[6] This price is for a replacement (changeout) of an existing switch.

[7] A fixed cost is a cost which does not vary with the level of output during a given period.

259370

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	
1998 Annual Access Tariff Filings	
Bell Atlantic Telephone Companies Tariff FCC No. 1	Transmittal No. 1057
NYNEX Telephone Companies Tariff FCC No. 1	Transmittal Nos. 505, 507

OPPOSITION OF BELL ATLANTIC TO PETITIONS TO SUSPEND AND INVESTIGATE

Michael E. Glover
Of Counsel

Joseph DiBella
1320 North Court House Road
Eighth Floor
Arlington, VA 22201
(703) 974-6350

Attorney for the Bell Atlantic
telephone companies

Dated: June 26, 1998

The short answer is that Bell Atlantic made no such assumption. Since approximately 97 percent of Bell Atlantic's switches were digital in 1997,[4] Bell Atlantic assumed 100 percent digital switches in its study of 1997 line port costs. Bell Atlantic then used the historical growth rate in local switching revenue requirements to project those line port costs from 1997 to the 1998-99 tariff period. This is a reasonable approach, since the percentage of line port costs in the tariff period obviously cannot exceed 100 percent. Likewise, since the general decline in switching costs has continued even after the conversion from analog to digital switches was made, it is eminently reasonable for Bell Atlantic to use the trend in actual local switching costs from 1991 to 1997 as a basis for forecasting total switch costs in general, and line port costs in particular.

MCI also argues that Bell Atlantic's line port costs are too low because they are a substantially smaller percentage of Bell Atlantic's total switch costs than the percentage of switch costs that the industry as a whole identified as nontraffic sensitive in the access charge reform proceeding. ***See*** MCI at 5-6, *citing* Access Charge Reform Order, 12 FCC Rcd 15982 (1997) at ¶131. However, the industry figure cited in that order included both line port costs and trunk port costs. In the Access Charge Reform Order, the Commission only assigned line port costs to the base factor portion; trunk port costs were moved from the local switching rate element to new trunk port rate elements. ***See*** Access Charge Reform Order at ¶127.

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[4] ***See*** Table I, row 0173 of Bell Atlantic's ARMIS Report 43-07 for calendar year 1997.

STATE OF MINNESOTA
OFFICE OF ADMINISTRATIVE HEARINGS
100 Washington Square, Suite 1700
100 Washington Avenue South
Minneapolis, Minnesota 55401-2138

April 2, 1998

Burl W. Haar
Executive Director
Minnesota Public Utilities Commission
350 Metro Square Building
121 Seventh Place East
St. Paul, Minnesota 55101

RE: In the Matter of the State of Minnesota's Possible Election to Conduct Its Own Forward-Looking Economic Cost Study to Determine the Appropriate Level of Universal Service Support; OAH Docket No. 12-2500-11342-2; MPUC Docket No. P-999/M-97-909.

Dear Dr. Haar:

Enclosed herewith and served upon you by mail is the Report of the Administrative Law Judge in the above-entitled matter.

Also enclosed is the original Proposed "Text Document" from MCI and AT&T. It will have to be modified to show the input changes ordered by the Commission.

Also enclosed is a disk containing copies of my Report and the "Text Document" in various word processor formats. The FCC requires that the final "Text Document" be submitted in WordPerfect 5.2 format.

The Exhibits and Transcript will be delivered to you tomorrow and the rest of the official record will be delivered next week. Our file in this matter is now being closed.

Rec'd w/o disk 4/3/98 PF

Sincerely,

STEVE M. MIHALCHICK
Administrative Law Judge
Telephone: 612/349-2544

SMM:lc
enclosure

cc: Persons on attached Service List (Report only)

OAH Docket No. 12-2500-11342-2
MPUC Docket No. P-999/M-97-909

STATE OF MINNESOTA
OFFICE OF ADMINISTRATIVE HEARINGS

FOR THE MINNESOTA PUBLIC UTILITIES COMMISSION

In the Matter of the State of Minnesota's Possible Election to Conduct Its Own Forward-Looking Economic Cost Study to Determine the Appropriate Level of Universal Service Support

REPORT OF THE ADMINISTRATIVE LAW JUDGE

ON SELECTION OF COST STUDY

aggregate default value for the percentage of structure costs borne by the telephone company. FNPRM, ¶¶ 80-81. Both models permit users to vary sharing percentages, although the default value for plowed-cable submitted with the HM is not 100%. DPS Ex. 112 (Legursky 1/23/98) at 19. Neither model was submitted with aggregate default sharing values of 66%.

133. The structure sharing assumption has a significant impact on outside plant costs. The HM sponsors contend that an efficient carrier would aggressively seek out sharing opportunities and would need to absorb only 33% of structure costs. The BCPM sponsors assumed to the contrary that there would be little sharing in the scorched node context because only telephone facilities are "scorched." DPS Ex. 113 (Legursky 2/3/98) at 7. However, U S WEST witness Dr. Fitzsimmons testified that Mr. Legursky's recommended value was within the range of reasonableness. Tr. 280. Again, this parameter should be set at a value that approximates current practice. The decision on this issue should be based on what efficient forward-looking carriers are experiencing in the way of structure sharing today. Ex. 115 at 15 (Fagerlund 1/23/98). On this basis, Department contends the appropriate percentage of structure cost the telephone company should absorb in aggregate is 66%. DPS Ex. 113 (Legursky 2/3/98) at 8-9. This is the roughly the midpoint of the percentage range of sharing which Mr. Kaalberg, Network Service President of McLeod USA, testified to the Iowa Commission that his company was able to achieve as a result of its aggressive search for sharing opportunities. USW Ex. 45 (Fitzsimmons 1/23/98) at 25. It is also the sharing percentage recommended by Sprint and by the Federal-State Joint Board. FNPRM, ¶ 78. The ALJ agrees.

Labor Factor

134. Dr. Fagerlund recommends that a regional labor adjustment factor of .99 for Minnesota be used because labor costs in Minnesota are one percent less than the default level for labor costs in the HM. This factor adjusts the wage portion of facility installation costs. The Department used this factor in its HM runs. DPS Ex. 115, EF 1 (1/23/98) at 5. The ALJ agrees.

Switch costs

135. The FCC tentatively concluded that the selected model should incorporate its staff's estimates of switching costs, namely, a fixed cost of $185,374.00 and per-line cost of $107.00. It sought comment on that conclusion. FNPRM, ¶ 132.

136. Both models can use the FCC switch cost as inputs, but both use their own defaults. Mr. Legursky analyzed the HM and BCPM switching modules to determine whether either module produced results in line with his knowledge of actual switching costs. Tr. 974. He concluded that the HM's results were "much better, but still conservative." Tr. 954.

137. Mr. Legursky acknowledged that the HM derived switch costs from a regression curve calculated from just four data points. Tr. 973. His concern however, was not with

the derivation of the cost curve, but rather with whether the curve generated accurate cost estimates. He testified: "I have absolute confidence in the results that are produced by the regression curve." Tr. 975. Mr. Legursky described the results of the BCPM methodology as "terrible" and as "way out of line with current industry practice." Tr. 953-54. While he approved of the BCPM methodology for computing switch costs, Mr. Legursky noted that the methodology relied on proprietary information that for practical purposes is not reviewable. DPS Ex. 112 (Legursky 1/23/98) at 25. He also testified that ". . . one model may have a superior methodology and not produce a superior result. . . ." Tr. 1020.

138. Mr. Legursky is knowledgeable of actual switching costs through his familiarity with Ameritech's switch contracts, his knowledge of the switch contracts of other RBOCs, and because he reviewed U S WEST switch contracts in connection with his work for the Department. Tr. 954, 974. Based upon his opinion, the ALJ finds that the HM's switching curve should be used for determining switching costs, rather than the FCC staff numbers.

Interoffice Trunking, Signaling, And Local Tandem Investment

139. The FCC tentatively concluded that the selected model should calculate specific cost estimates for the interoffice elements (i.e. interoffice trunking, signaling and local tandem facilities). FNPRM, ¶ 141. Both models deploy SONET ring technology to connect stand-alone switches to tandems, to connect remote to host switches, and to connect host switches to tandems. Neither model employs an optimizing algorithm in creating SONET rings and neither stores intermediate data to detail specific locations, capacity, or utilization of rings. Neither model appears to have an advantage in this area. DPS Ex. 112 (Legursky 1/23/98) at 26.

Allocating Non-Facility Expenses

140. The purpose of the cost models is to develop a cost for the supported services on a per line basis. Thus, all costs must be assigned to lines. The parties to this proceeding have proposed two general methods for allocating general overhead and support expenses to lines. One approach is to allocate such costs based upon all or some subset of facility investments. The second approach is to allocate such costs on a per line basis, regardless of the differences in the amounts invested in each line. The FCC has tentatively concluded that the preferred model should provide the user with the capability to calculate each category of expense based on either an investment basis or a per line basis, at the user's election. FNPRM, ¶ 157. Both models generally comply with the FCC requirement that users be able to specify whether each category of expense should be allocated on a per line or per dollar of investment basis. DPS Ex. 115, EF 1 (1/23/98) at 41. Testimony at the hearing, however, indicated that with some categories of expense, such as general and administrative costs and executive and planning costs, could not be entered into BCPM on an investment basis. Tr. 149. In general, it appears that only plant-specific expenses can be placed on either a per line or on an investment basis in BCPM. Tr. 163.

SUPPLEMENTAL DIRECT TESTIMONY

OF

BILL BOLLINGER

BEFORE THE

NORTH CAROLINA UTILITIES COMMISSION

ON BEHALF OF

CAROLINA TELEPHONE AND TELEGRAPH COMPANY

AND

CENTRAL TELEPHONE COMPANY

DOCKET NO. P-100, SUB 133d

FEBRUARY 16, 1998

SUPPLEMENTAL DIRECT TESTIMONY OF

BILL BOLLINGER

BEFORE THE

NORTH CAROLINA UTILITIES COMMISSION

DOCKET No. P-100, SUB 133d
FEBRUARY 16, 1998

Q. Please state your name, occupation, and business address.

A. My name is Bill Bollinger. I am presently employed as Manager - Network Costing and Pricing for Sprint/United Management Company. My business address is 4220 Shawnee Mission Parkway, Fairway, Kansas 66205.

Q. Are you the same person who filed testimony December 15, 1997, regarding cost studies for Switching/Features, Call Termination, Interim Number Portability, Tandem Switching and Annual Charge Factors on behalf of Carolina Telephone and Telegraph Company and Central Telephone Company (hereafter collectively referred to as "Sprint")?

A. Yes.

Q. What cost studies, if any, have changed from the December 15 submittal?

A. The switching cost study has been changed to incorporate the switch discount associated with new switch purchases. The original cost study reflected a growth switch discount

representative of additional investment to current switches. Sprint has determined that a new switch discount is more representative of forward looking switching costs than a growth switch discount. The result of this change is to reduce the Switch Port, Minute of Use, Features, Local Call Termination, Interim Number Portability and Tandem Switching Elements. In addition to the above-mentioned change, the Local and Tandem Trunk investment and minutes of use were combined. The result of this change nets to zero and is used to provide for an average trunk cost per switch whether the trunk is utilized for local switching or tandem switching.

Q. Does this conclude your supplemental direct testimony?

A. Yes.

Attachment A

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